TROPICAL RAINFALL MEASURING MISSION

September 18, 2000 – September 24, 2000
DOY 262 - 268
Day of Mission 1026 - 1032

TRMM MISSION OPERATIONS

- TRMM is flying in the +X Forward direction as of September 7th (00-251) at 13:38:12z.
- Yaw maneuver #47 is scheduled for October 1st (00-275).
- Delta-V #229 is scheduled for September 25th (00-269), using the LBS thrusters.
- The Beta angle range for 00-269 to 00-275 is +27.3° to -00.5°.
- The next Monthly Status Review (MSR) is scheduled for October 4th (00-278).
- The next End of Life Planning meeting is scheduled for September 27th (00-271).
- The next Flight Software CCB meeting is scheduled for September 28th (00-272).
- 99 days remain until Extended Mission science operations begin on January 1st, 2001.

TRMM SUBSYSTEM OPERATIONS

Attitude Control System (ACS)

00-262 (Monday, September 18th)
Delta-V maneuver #227 was successfully conducted at 15:31:55z and 16:17:41z for durations of 37.5 and 26.5 seconds respectively, using the LBS thrusters. The off-modulation of the +Pitch thruster (#2) for burn 1 and 2 was 25.7% and 26.5% (74.3% and 73.5% on time). The off-modulation of the -Yaw thruster (#1) for burn 1 was 1.7% (98.3% on time). The remaining fuel is 528.402 kg, and the final apogee and perigee height is 354.53 km x 347.58 km.

00-265 (Thursday, September 21st)
Delta-V maneuver #228 was successfully conducted at 15:32:00z and 16:17:49z for durations of 40.5 and 25.0 seconds respectively, using the LBS thrusters. The off-modulation of the +Pitch thruster (#2) for burn 1 and 2 was 25.3% and 28.2% (74.7% and 71.8% on time). The remaining fuel is 527.175 kg, and the final apogee and perigee height is 354.87 km x 347.57 km.

00-266 (Friday, September 22nd)
The standard procedure of temporarily widening the continuity limits was performed and the new daily EPV began propagating at 22:00z. The EPV failed continuity on the day following a Delta-V maneuver, this time by only 8 km, in the Y-axis.

Flight Data System (FDS)/Command & Data Handling (C&DH)

The UTCF is at 31535996.839259 seconds with a drift value of –606.0 µs. The current frequency standard offset remains x'7a2' with a current drift rate of –2.8790 µs/hr.

Reaction Control Subsystem (RCS)

The RCS subsystem performed nominally during this period. See the ACS section for specific Delta-V information.

Power Subsystem

AR #083: PSIB ANOMALY AND LOW POWER RECOVERY TIMELINE II

At 09:00:50z on Friday, September 22nd (00/266), the instruments were autonomously powered off a second time due to the detection of low battery state of charge (<70%) in PSIB-A telemetry. This telemetry became corrupt as part of a further failure within the PSIB-A, which coincided with increased temperatures in the PSIB-A analog and power cards. Several hours later, most of the remaining PSIB-A telemetry railed low, including essential bus voltage and current readings. The analog and power card temperatures then returned to normal levels, which seems to indicate that the cascading effect of failed multiplexers within the PSIB-A has concluded. Unfortunately, the result is that the PSIB-A can no longer be used for reliable power system monitoring. The symptoms experienced on PSIB-B are not the same as those on PSIB-A. This points to the probability that the failure experienced on PSIB-B may not be directly related to that experienced by PSIB-A, and the PSIB-B problems are not as severe as the failures experienced on the A side. The PSIB-B cell voltage telemetry is no longer valid except battery 2 cells 15-22, but all the remaining PSIB-B telemetry is normal and stable. The cell voltage telemetry does exhibit unusual behavior, however, because the battery 1 cells all rail high for approximately the last 16 minutes of each eclipse period. Once the PSIB-B problems were believed to be different from the A side and less severe, the decision was made to power on the science instruments again starting with the 00/266 17:01z event.

Following additional risk analysis, the decision was made to change the power management configuration from Constant Current Mode with a cap of 12 amps per battery to Peak Power Tracking with a VT-Level of 4. If further specific failures occur on both PSIB-A and PSIB-B, the capability to command the SPRU could be jeopardized, although the PSIB command pathways have not been affected by this anomaly. The reasoning behind this decision was that any risk this new charging profile might have on the batteries or individual cells would still be preferable to having the SPRU in the Constant Current charge mode with no capability to command it out of that mode, which would effectively end the mission. Depending on the outcome of further analysis, however, a return to CC mode could be made to reduce the battery charge current levels if it is concluded that there is no real risk of losing the dual command capability to the SPRU. If this decision cannot be made, then other operational scenarios are being considered to reduce the battery charge current levels, including possible changes to the solar array tracking configuration. The command activities for the second loadshed recovery and new power management configuration are listed below.

00-266 (Friday, September 22nd)

1.	00/266 06:48:00z	Analog Card Temperature begins increasing from 22° to > 26° C
2.	00/266 08:59:12z	TSM-1 detects Battery 1 State of Charge < 70%
3.	00/266 08:59:14z	RTS 2 (Loadshed) Starts, which leads to the execution of RTSs 13, 15, and 34
4.	00/266 09:00:50z	CERES/LIS/TMI/HPT/VIRS/PR OFF (TMI Survival Heaters ON)
5.	00/266 16:26:00z	Analog Card Temperature peaks at 28° C and remaining PSIB-A low voltage analog telemetry drops out.

INVESTIGATION / RECOVERY ACTIVITIES

00-266 (Friday, September 22nd)

1.	00/266 17:08:19z	TSMs 1-8 Disabled and Low Power Checking Disabled to prevent further loadsheds once instruments are back on
2.	00/266 17:11:41z	PR relay configuration set using WPR_RFPS_RELAY procedure
3.	00/266 17:13:52z	High Pressure Transducer turned back ON using /RA_HPT_ON
4.	00/266 17:16:28z	MPWRON procedure started for the TMI Instrument
5.	00/266 17:17:33z	MSPINUP procedure started for the TMI Instrument
6.	00/266 17:20:10z	MRCVRSON procedure started to power ON the TMI receivers
7.	00/266 17:20:44z	LPWRON procedure started to power ON the LIS Instrument
8.	00/266 17:22:14z	LISCONFIG procedure started to reconfigure the LIS Instrument
9.	00/266 17:40:00z	VPWRON procedure started to power ON the VIRS Instrument
*	00/266 17:24:06z	PSIB-A Analog Card temperatures returned to normal levels
10.	00/266 18:01:40z	PRSTARTON procedure started to power ON the PR instrument
11.	00/266 18:06:33z	PTXCODE103 procedure started by PRSTARTON
12.	00/266 18:11:54z	PRXCODE103 procedure started by PRSTARTON
13.	00/266 18:18:01z	/PRXATTN SEL9DB command sent for final nominal configuration
14.	00/266 18:19:53z	VNORMOUTGAS procedure started to begin VIRS Outgassing ops
15.	00/266 19:38:22z	Transition to VT-4 and Peak Power Tracking as a precaution
16.	00/266 20:34:31z	VOUTGAS_HTRS procedure started to continue Outgassing ops once mounting ring temperature > 25°C

00-268 (Sunday, September 24th)

1.	00/268 03:26:10z	VIRS instrument Resets itself (known anomaly)
2.	00/268 08:12:07z	VIRS Outgassing is restarted (VNORMOUTGAS procedure)
3.	00/268 09:23:11z	VOUTGAS_HTRS procedure started to continue Outgassing ops once mounting ring temperature > 25°C
4.	00/268 12:38:33z	VOUTGAS_HTRS procedure started to continue Outgassing ops once intermediate stage temperature > 289°K
5.	00/268 16:18:20z	PRSURVHTRS procedure started to re-enable PR K1 Survival Heater Relay (This procedure is typically run approximately 48 hours after PR ON)

00-269 (Monday, September 25th)

1.	00/269 14:29:44z	VINITOUTGAS_END procedure started to conclude Outgassing ops
2.	00/269 14:30:39z	VRADCDROP procedure started to open Radiative Cooler Door
3.	00/269 15:14:06z	RTSs 2, 15 Re-enabled and Loadshed Capability restored to power off instruments if spacecraft should transition to SunAcq or Safe-hold
4.	00/269 17:39:06z	VOUTGAS_HTRS procedure started once Intermediate Stage temperature cools to below 220°K
5.	00/269 17:39:44z	VMISSMD procedure started to resume VIRS Science Operations
6.	00/269 21:34:49z	Low Power Loadshed Capability restored for PSIB-B low bus voltage detection only

Remaining activities to be performed while anomaly investigation continues:

1. Load the PSIB software patch to PSIB-B
2. Develop an alternate method to detect a low bus voltage level if PSIB-B telemetry corrupts further

3. Modifications to TSMs / RTSs and low bus voltage level related to the Power subsystem
4. Power ON the CERES instrument when solar beta angle is at or near zero degrees
5. Return to Constant Current Mode for battery charging once risk analysis deems it safe to do so
6. Develop alternate strategies to reduce stress on batteries if Peak Power Tracking continues: possibly off-pointing the solar arrays and/or only transition to CC Mode during certain parts of each orbit

Electrical Subsystem

The Electrical subsystem performed nominally during this period.

Thermal Subsystem

The Thermal subsystem performed nominally during this period.

Deployables Subsystem

The Deployables subsystem performed nominally during this period.

RF/Communications Subsystem

The RF/Communications subsystem performed nominally during this period.

SPACECRAFT INSTRUMENTS

CERES

CERES remains powered OFF, following the original PSIB anomaly loadshed on 00-261.

LIS

00-266 (Friday, September 22nd)
Due to the PSIB Anomaly, the instrument was powered Off briefly during this period. (See Power section)

PR

00-266 (Friday, September 22nd)
Due to the PSIB Anomaly, the instrument was powered Off briefly during this period. (See Power section)

The list of Internal Calibration times over Australia in which PR was not radiating is below:

2000-262/08:12:22 - 08:14:31z	2000-263/00:30:36 - 00:34:39z
2000-263/07:01:04 - 07:03:18z	2000-264/07:23:44 - 07:25:53z
2000-265/06:12:18 - 06:14:31z	2000-265/22:32:15 - 22:34:44z
2000-266/00:02:00 - 00:03:00z	2000-266/06:35:06 - 06:37:13z
2000-267/05:23:51 - 05:26:02z	2000-267/21:41:47 - 21:46:40z

2000-268/05:46:39 - 05:48:36z

TMI

00-266 (Friday, September 22nd)
Due to the PSIB Anomaly, the instrument was powered Off briefly during this period. (See Power section).

VIRS

00-266 (Friday, September 22nd)
Due to the PSIB Anomaly, the instrument was powered Off briefly during this period. (See Power section). After being powered On, it was placed into Outgas mode.

GROUND SYSTEM

00-267 (Saturday, September 23rd)
ER #204 Tr2ws1 Workstation crashed, hardware maintenance was notified and the power supply was replaced.

Event Reports

ER #204: tr2ws1 Workstation Crash (See Ground System section)

ER #205: Daily EPV update continuity failure (See ACS section)

Generic Late Acquisition Reports (for TTRs 19639)

GLA #70: 00-261/06:59:00z; TDS; 1 minute 26 seconds late AOS.

New Anomalies

No new Anomalies occurred during this period.

Recurring/Open Anomalies

AR #083: PSIB Anomaly (See Power section).

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